BRIDGE OF ALLAN.

ITS CLIMATE AND WATERS.

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C C N T E N T S .

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The study of climate and mineral waters as therapeutic agents of no inconsiderable value in the treatment of disease, is receiving an ever-increasing amount of attention from those members of the medical profession who devote their time to this end. This is also the case on the part of the general practitioner, whose efforts are directed to the advancement of the best interests of his patients by every means at his command. That such is the case is evidenced by the recent formation in London of a society to advocate the interests and claims of balneology and climatology, and to encourage investigation in these branches of science; as well as by the numerous additions which have been made to the literature on the subject, in which are noted the results achieved at the various resorts, both in this country and abroad, where the climatic conditions, and, in many instances, the mineral springs, have furnished the invalid with renewed health and vigour. In order that in the selection of a health resort preference may be given to that one which, from its meteorological statistics, situation, and special advantages, approximates most closely to the ideal which the exigencies of the case may demand, it is important from the physician's point of view that reliable information should be obtainable regarding

those places that have in the past gained a reputation for the beneficial influence of their climate, in common with other local characteristics which have been the means of distinguishing them from their immediate surroundings and from other places less favourably situated. Such information is, in many instances, most difficult to obtain, owing to the absence of reliable statistics regarding the meteorological and vital conditions which prevail. The result is that many places, although they may possess all the inherent advantages of others better equipped in this respect, yet only receive a small share of the attention they are entitled to and which would be given to them were these data supplied.

The subject of the present article, the village of Bridge of Allan, may be placed in this category, and it is for the purpose of furnishing a short statement of the more important particulars usually considered in the choice of a health resort that these notes on its climate and mineral waters have been written.

As a health resort Bridge of Allan has been known and esteemed during a lengthened period of time; for the beauty of its scenery, its equable, mild and salubrious climate, the protection which its sheltered situation affords from the coldest winds, and for the presence in its midst of saline springs whose waters

have been utilised for many years as remedial agents by individuals in all classes of the community, with markedly beneficial results in numerous and well authenticated instances.

That it enjoys a wide reputation for its climatic advantages can perhaps be most adequately shown by quoting a few of the references which have been made regarding this resort. Dr. Haldane, in a paper on Bridge of Allan, read before the British Climatological Society,* introduces his subject with the following remarks :- "Situated in the midst of a district rich in historical associations, surrounded by scenes of natural beauty which have inspired the song of the poet, the romance of the novelist, and the brush of the painter; endowed by nature with mineral wells of wonderfully health restoring power, and possessed of a climate of exceptional mildness, Bridge of Allan is entitled to the name it has gained - the premier Spa of Scotland." Dr. Myrtle (Harrowgate) remarked at the same meeting** that, having known the place for a period of sixty years, he felt he must own that the Climate of Bridge of Allan was one of the most perfect of its class, dry, equable, and, comparatively speaking, much more suitable for cases of bronchial

* 1896

** Ibid.

irritation and phthisical cases than any other part of Scotland". A recent American writer* refers to it shortly as follows :- "At the Bridge of Allan, a beautiful spot near Stirling, is a salt spring. The situation of the place is protected and the climate mild." Further references are found in Buchan's "Text Book of Meteorology" where a short and concise account is given of some of the causes of the celebrity of the village, and in a book by Dr. Rodgers entitled"A week at Bridge of Allan". Opinions from various sources might be further multiplied, but enough have been mentioned for my purpose.

From the facts to be stated regarding the atmospheric conditions we will be in a position to consider the question of the climate of the district, that is, the average of the prevailing conditions of the weather estimated during a sufficient period of time to enable correct conclusions to be drawn regarding it; but before passing to this, the meteorological part of the subject, it is equally necessary and important to note the geographical position of the village, and the geological formations underlying it, so that the influence of these factors on the health of the inhabitants may not be overlooked.

* Solly - Medical Climatology 1897.

GEOGRAPHICAL.

The village is situated in Stirlingshire, on the north side of the valley of the Forth, at the south-western extremity of the Ochil Hills, a range which extends nearly to Abernethy on the River Tay, and forms a background to the village on the north and north-east, the Abbey Craig continuing the shelter to eastwards. A few of the terminal elevations constituting the grounds of Keir extend to the west, and in the distance beyond, the Bens with their lofty summits are seen stretching like a wall along the horizon. Across the valley, where the rivers Teith and Allan join the Forth, the Touch Hills close the view on the south-west; while to the south the prospect is only interrupted by the Castle rock of Stirling rising abruptly from the level of the plain. It is necessary to note these facts in view of the great influence which natural surroundings have in modifying climate; but a mere description such as this conveys with it little conception of the grandeur and beauty of the scenery surrounding the village on every side. The views of the Grampians on the one hand, and the fertile valley of the Forth with the tortuous windings of the river on the other, combined with the many lovely walks and drives in the neighbourhood, give the visitor

every inducement to spend as much time as possible in the open air; while the refreshing change to those accustomed to the monotony of city life when they come for a season to reside among such scenes, exhilirates the mind, and imparts to the body that sense of well-being which is one of the most efficient aids in restoring health and mental energy.

The village of Bridge of Allan may be divided into two parts, the one situated on level ground, the other occupying the natural terraces on the hill. The majority of the houses being villas ensures a free circulation of air around each, with ample exposure to sunlight. A hydropathic, hotels, well appointed shops, and other conveniences enable visitors to enjoy the comforts of the town while experiencing all the advantages of a residence in the country. The Airthrey Mineral Springs being one of the chief features of the place, they will be considered separately.

V I T A L S T A T I S T I C S.

In 1891 the population was estimated as 3221. The following table shows the number, and causes of deaths amongst the population during the years 1895, 1896, and 1897, as recorded by the registrar for the district.

	1895.	1896.	1897.
All causes.	73	62	71
Old age.	6	7	5
Accidental.	3	1	4
Phthisis and Tubercle.	17	12	16
Other Respiratory Diseases.	6	6	5
Circulatory diseases.	11	20	13
Alimentary diseases.	-	3	3
Nervous diseases.	6	3	10
Cancer.	7	2	2
Diabetes Mellitus.	-	1	-
Pernicious Anaemia.	1	1	-
Acute Rheumatism.	1	1	-
Cirrhosis of Liver.	2	3	1
Septicaemia	1	-	1
Bright's Disease.	1	-	2
Peritonitis.	3	-	4
Influenza.	5	-	1
Measles.	-	-	1
Scarlet Fever.	-	-	1
Infantile Diarrhoea.	1	1	-
Atalectasis.	-	1	2
Ill defined causes.	2	-	-

This list, including as it does deaths among visitors as well as permanent residents, accounts in great measure for the fact of the comparatively high death rate from phthis, owing to the number of such

cases amongst patients coming to reside for a time; many of whom are already in the last stages of the disease.

G E O L O G I C A L.

Regarding the site of the village from a geological point of view, an interesting feature is that it is built on a portion of what was at one time in the earth's past history the shore of an inland sea, and, although time has wrought many changes in the aspect of the country, and land that was once covered by water is now elevated and dry, yet the impress of the past is still seen in the large bank of rounded water-worn pebbles that extends from the west end of the village eastwards to near the old churchyard of Logie. Numerous other portions of this beach are visible in adjoining districts. Its internal structure can be viewed in the sides of a cutting which passes obliquely through it at the lower end of the road to Sheriffmuir. Three distinct formations are represented in the rocks of the district, they are the Carboniferous, the Old Red Sandstone, and Eruptive or Volcanic Rocks. All three are in apposition near the western side of the Abbey Craig. The Carboniferous formation extends from the base of the Ochil Hills to the south-east, underlying the alluvial clays of the Forth Valley. It is represented chiefly by calciferous sandstone, limestone, and the coal measures in the east beginning the coal-

fields of Scotland. The Old Red Sandstone reaches here its southern limit, after spreading over the country to the north and west, where it forms the chief central formation of Scotland. Flagstones, sandstones, and conglomerates are the local varieties, and while the former predominate, there is a large bed of the latter on the west side of the village. Cephalaspis, a fossil fish, belonging to the Ganoid order, the earliest known type of fishes, has been found in the sandstone rock of a quarry in the upper part of Bridge of Allan.

After the deposition of these sedimentary rocks of the Old Red Sandstone period, volcanic action occurred, and the result of the eruption has been the formation of sheets and masses of eruptive rocks which give origin to the Ochil Hills. This eruptive or trap rock is wedged in between the other two formations and covers the intervening ground to the north-east. In structure it consists for the most part of amygdaloid and porphyry. A sheet of porphyry comes to the surface at the north-east end of the village, while the space between it and the conglomerate of the Old Red Sandstone is filled by tuff agglomerate, being the remains of blocks of lava consolidated into a mass. The trap rock also forms the heights of Stirling, Craigforth and the Abbey

Craig. The ores found in the Ochils are silver, copper and cobalt, in veins situated in the southern slopes of the hills. Copper was formerly worked at Bridge of Allan, but the mine has been disused for many years. To the south of the Ochil range the plain is covered by a deposit of alluvial clay attaining a depth in some parts of nearly seventy feet. Under the superficial layers, which have been formed within recent times by the tides of the Forth, there are beds of sand containing numerous oyster, cockle, and other common marine shells. The skeletons of two whales were found in the clay, the one to the south and the other to the west of the village, some years ago, showing that the district was at one time covered by the sea up to the bases of the hills. The Glacial Epoch has also left its mark in the form of deposits, containing boulders and clay, amongst the hills. These deposits have been brought down by glaciers that have travelled from the northern regions. In their passage over the ground, the ice-blocks and stones have worn the rock surfaces, leaving them smooth and bevelled off at the edges. A typical example of this action is seen on a mass of conglomerate lying at the side of the Sheriffmuir Road near the cutting already referred to. The natural rough surface of this kind of rock has been ground level and shows the parallel longitudinal scratches which are characteristic of the effects produced by a moving stream of ice.

METEOROLOGICAL.

The terraces slopes of the hill on which the greater part of the town is built, face to the south and ascend from the level of the valley of the Forth, commonly known as the carse, to an altitude of 400 feet above sea level. The houses with their southern exposure are thus placed in a most advantageous position to receive all the sunshine obtainable during these periods when there is least, as in the early and later parts of the day, and more especially during the winter months. The sun then only attaining a low altitude, the obliquely falling rays of light are less concentrated on level ground as compared with the side of a hill, which therefore receives more benefit from their heating properties. The amount of actual sunshine at Bridge of Allan has been recorded by Campbell-Stokes Apparatus during the last two years, 1896 and 1897, and is as follows:-

	Sunshine.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1896.	Total Hours	-	65	115	156	264	107	79	116	40	72	18½	25½
	Mean per Day.	-	2.2	3.7	5.2	8.5	3.5	2.5	3.7	1.3	2.3	.6	.8
1897.	Total Hours.	52½	47	65	105½	177	78	157½	100	100½	73¼	33½	34
	Mean per Day.	1.6	1.6	2.0	3.5	5.7	2.6	5.0	3.2	3.3	2.3	1.1	1.0

The winds, as is well known, have more influence than the prevalence or deficiency of sunshine in altering the state of the weather and consequently affecting the climate. The shelter which the background of hills, with their tree-clad heights, affords to the village largely modifies the force of air currents from the north, and similarily interposes on the eastern side a most efficient barrier to the cold winds, which are so prevalent from that direction in the earlier months of the year. The east wind, chilled by its passage over the frozen regions of Northern Europe, is typically a cold, dry wind, rarely associated with rain. Its all-pervading influence is felt by nearly every member of the community, especially by the less hardy individuals and those of sensitive temperament. Exposure to this wind chills the skin surface by causing contraction of the superficial blood vessels. The internal blood pressure is increased, inducing a state of passive congestion in the brain, liver, and other viscera which is in many cases followed by congestive headaches, so-called bilious attacks, dyspepsia, and the aggravation of already existing conditions, such as the increase of catarrhal symptoms in patients who are the subject of chronic bronchitis or nephritis. Many persons can

foretell the onset of an east wind by the peculiar sensations they experience, which have been variously described as: feeling cold water trickling down the back, or as if an electric current were passing through the extremities, mental confusion, and the like. When the cutaneous vessels fail to react to the stimulus of the cold, either through weakness in their muscular walls or defective innervation, the loss of heat from the body is rapid, resulting in depression, lowered vitality, and diminution of the resisting powers of the tissues, rendering them a suitable nidus for the growth and multiplication of pathogenic organisms with their ensuing pathological processes. Acute catarrhal conditions of the respiratory passages and lung substance, for example, are frequent during the prevalence of east winds. It is for such reasons that so many people leave this country for the continent and elsewhere, in search of a more genial climate during spring, when the east winds attain their maximum frequency, and it is to such persons that Bridge of Allan offers a most suitable refuge on account of its completely sheltered position. It has also the advantage of being easily accessible without necessitating a long journey with its accompanying fatigues. A practical test of the shelter which the village enjoys may be made by anyone proceeding to it from the

direction of Stirling when an east wind is blowing. Where the road crosses the level carse the full force of the wind is felt sweeping up the valley, and then as one nears the village, the change from the raw coldness of the air to the calm and comparative warmth is very noticeable. It is during the months from November to March that the winds attain their greatest force, and the following has been their average frequency from the various points during 1897;

Direction.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm or variable.
Monthly Average.	4.5	10.5	69.0	19.0	5.0	28.0	75.5	12.5	141.0.

TEMPERATURE

The atmospheric temperature has been characterised as equable, having a small range in degrees throughout the year, thus securing moderation in the heat of summer and cold of winter. The elements principally concerned in the regulation of the temperature are the winds and rainfall, and it will be of interest to note their effects on the local climate, combined with the influence of soil, atmospheric humidity and exposure to solar influences. The force of winds which would lower the temperature is greatly modified by the sheltered situation of the village, and the warmer winds from the west and south have free access, especially from the latter direction, owing to the level configuration of the ground to the south. As shown by the reports of the Scottish Meteorological Society, it is from the South-west in Scotland that the wind attains its greatest average frequency, and being a warm wind, its influence on the temperature is specially marked, gaining as it does an unobstructed entrance to the district through the valleys of Clyde and Forth, which form a large gap in the watershed of Scotland. The rainfall increases the atmospheric temperature by giving up a

large amount of latent heat during the condensation of the water vapour into rain. It has been estimated by Haughton that "one gallon of rainfall gives out latent heat sufficient to melt seventy-five pounds of ice or to melt forty-five pounds of cast-iron", and from this fact it is evident that the large fall of rain over Ireland and the west coast of Scotland indirectly benefits the country to the east by warming the winds coming from these rainy districts and removing a large part of their superabundant moisture. The southern exposure of the village, as previously pointed out, gains for it a large share of whatever light and heat the sun may afford in winter; while the sloping character of the ground facilitates an interchange of warm air from the lower levels with cooler air which sinks to take its place, and in its turn being warmed ascends, and thus tends to maintain a constant temperature. The presence of water vapour in the air impedes the radiation of heat from the ground, and vegetation has a similar effect by night, so that these also prevent sudden changes of temperature, and cooling or heating of the atmosphere becomes a gradual process. Regarding the nature of the soil, this varies with position. That of the carse land is rich alluvial clay, while the ground underlying the upper part of the village consists chiefly of boulders

and gravel resting on sandstone rocks. The clay soil of the valley is in its natural state, cold, damp, and unhealthy, from its propensity to prevent evaporation of moisture from beneath it or the filtration of water through it, but under cultivation and drainage - and in this district the ground is in the highest state of cultivation - the soil is broken up, and what was formerly wet and impermeable to air becomes dry and comparatively porous. The soil of the terraced slopes of the hill affords typically healthy sites for dwellings. The rain water drains off rapidly through the interstices of the ground and the removal of water is also aided by an efficient system of artificial drainage which the place is supplied with. From a combination of these various agencies the equable temperature is derived that has made the village a resort from the changeableness of the climate usually experienced in this country, and although the annual temperature average in this district does not attain to a relatively high figure, yet, as Buchan* remarks, "these advantages of Bridge of Allan not only give greater facility for open air exercise, but by offering to a great extent protection from the hurtful effects of the weather most trying to invalids, viz: east winds and severe cold winter, are far more to be prized than an annual temperature several degrees higher". The following records of the temperature in this district are taken

*Textbook of Meteorology.

from three different sources, so that an approximately correct estimation may be formed regarding it. These sources are: 1st, Observations taken at Bridge of Allan during 1896 and 1897. 2nd, Observations taken on the carse, two miles south of Bridge of Allan during the years 1890 to 1895 inclusive. 3rd, From the maps published in the Journal of the Scottish Meteorological Society, where the isothermals passing through the district shew the mean temperature on an average of 24 years ending 1890.

Thermometer in the shade.		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year.
Bridge of Allan. 1896.	Maxm.	-	46.3	48.9	55.4	65.4	64.6	66.8	65.0	59.5	46.1	46.0	42.0	55.0
	Minm.	-	36.8	34.6	39.8	41.5	50.0	49.7	48.2	47.5	34.7	36.3	31.9	41.0
	Mean	-	41.5	41.7	47.6	53.4	57.3	58.2	56.6	53.5	40.4	41.2	36.9	48.0
Bridge of Allan. 1897.	Maxm.	39.2	44.6	47.0	51.1	57.2	62.5	68.5	68.5	61.1	53.7	49.8	43.1	53.8
	Minm.	29.1	34.8	35.2	35.3	40.0	47.7	49.3	52.0	42.6	40.0	40.5	32.9	39.9
	Mean	34.1	39.7	41.1	43.2	48.6	55.1	58.9	60.2	51.8	46.8	45.1	38.0	46.8
Carse of Forth. Average of 1890-1896.	Maxm.	41.7	43.6	49.2	56.9	60.4	67.4	69.8	67.7	63.1	52.7	46.6	42.0	55.0
	Minm.	30.0	30.8	32.4	35.4	40.5	46.4	48.3	47.7	44.8	36.8	34.8	32.9	38.4
	Mean	35.8	37.2	40.8	46.1	50.5	56.9	59.0	57.7	53.9	44.7	40.7	37.4	46.7
Scot. Met. Soc. 24 yrs. average.	Mean	38.0	39.0	41.0	45.8	50.8	57.0	59.0	58.0	54.4	47.4	41.0	39.0	47.8

Mean average seasonal temperature calculated from the above data.

Spring.	Summer.	Autumn	Winter.
50.4	56.9	45.5	38.4

R A I N F A L L.

Dr. Buchan in his "Rainfall of Scotland" has pointed out that three agents influence the amount of the fall, viz: temperature in its seasonal rise and fall, prevailing winds, and the physical configuration of the country with reference to these winds. Applying these facts to the district under consideration, it will be seen by comparison of the monthly rainfall at Bridge of Allan with the temperature, that during the period extending from the months of February to July, when the temperature is on the increase, the fall of rain is less than during the other months from August to January, when the temperature is decreasing. A diminution in the rainfall also coincides with decreased force in the winds, and where hills intercept the air currents, causing them to ascend to higher and colder regions of the atmosphere, the condensation that results in the water vapour forms rain, the precipitation of which is greater on the windward side of the range, and, as in the case of the Grampians, the country to the east has a greatly diminished rainfall compared with that to the west, as the winds come most frequently from the latter direction. The rainfall on the west coast of Scotland averages upwards from 60 to 80 inches yearly, while on the east coast it is

usually below 30 inches. At Bridge of Allan the amount is intermediate between these figures, and usually range from 35 to 40 inches per annum.

The following are the means of the monthly, seasonal, and yearly rainfall at Bridge of Allan, and also at three places in the immediate neighbourhood.

Rainfall.

A. At Bridge of Allan.

a. Amount in inches.

b. Days on which .01" or more.

B. At Kippendavie, for 25 years ending 1890.

C. At Kippenross, for 25 years ending 1890.

D. On the Carse, 2 miles south of Bridge of Allan for 3 years 1894-1896.

1896 a.	1896 b.	1897 a.	1897 b.	B.	C.	D.	
		1.99	15	3.94	4.10	3.74	Jan.
1.22	12	2.70	18	2.61	2.68	4.79	Feb.
3.61	20	4.77	26	2.34	2.27	2.80	Mar.
2.29	12	2.15	16	1.94	1.67	1.89	Apr.
0.63	16	2.20	17	2.00	1.78	1.26	May
3.61	17	5.75	21	2.19	1.95	3.01	June
4.77	17	1.44	13	2.99	2.69	3.55	July
2.22	16	5.97	22	3.40	3.13	4.19	Aug.
4.05	16	2.51	21	3.34	3.29	1.99	Sept.
3.60	15	1.83	12	3.81	3.48	3.01	Oct.
1.00	15	3.19	17	3.73	3.42	2.73	Nov.
5.08	20	5.39	21	3.55	3.65	4.04	Dec.
34.99	176	39.89	219	35.84	34.11	37.00	Year

Mean Seasonal Rainfall, calculated from above data, in inches:-

Spring.	Summer.	Autumn.	Winter.
6.9	9.6	10.4	9.6

HUMIDITY.

Humidity, or water vapour in a gaseous state, is absorbed and retained in the atmosphere in an amount which is proportional to the temperature; the warmer the air is the more water vapour it can absorb until the saturation point is reached; but if the temperature is falling, saturation with humidity is more rapidly attained, and below this point increasing cold results in a condensation of the superabundant humidity into rain, mist or dew, the variety depending on the amount of moisture and the presence of suspended dust particles. Fogs are only formed where the air contains sufficient foreign bodies, and their absence in this district is largely due to the purity of the air and the isolation of the village from dust and smoke producing centres such as large towns, factories and coal pits. It is necessary to distinguish between the terms humidity and dampness, as they are often confused. An atmosphere only becomes damp, and consequently injurious to health, when condensation of the humidity occurs, so that damp air is air not only saturated with gaseous water vapour, but where this vapour is passing from its gaseous state into actual moisture. The fall of rain which usually ensues, temporarily diminishes the dampness of the air by pre-

cipitating the excess of moisture. The chief source of the atmospheric humidity is in the evaporation of water from sea, lake or river surfaces, and secondarily from the rainfall, which both affords a source of moisture and also facilitates its absorption by the latent heat given up during the fall. This latent heat warms and expands the atmosphere and renders it capable of absorbing a fresh supply of moisture. Humidity is in itself beneficial, and when present in a relatively moderate amount it confers a feeling of softness to the air, and by retarding the radiation of heat from the soil in cold weather and intercepting many of the sun's rays in the heat of summer, it equalises extremes of temperature and promotes the growth of vegetation. At Bridge of Allan the relative mean yearly humidity has been estimated at $\frac{84}{100}$ (100 = saturation point) an amount the climate owes much of its equable character to, and the shrubs and plants that luxuriance of growth which makes the gardens look so fresh and attractive. Air containing only a small proportion of water vapour is cold, dry and stimulating. Under its influence all the systems of the body are rendered more functionally active, the appetite improves, and an increased capacity for muscular exercise is established. These effects

are beneficial in certain pathological conditions, as phthisis, in early stages of the disease, where the patient is young and able for a certain amount of exertion, when besides the general tonic effect obtained, there is also the dryness of the air and its capacity for taking up moisture to be considered, which favours increased evaporation from the pulmonary air vesicles and so lessens expectoration and diminishes the number of crepitations. Such an atmosphere does not, however, suit all temperaments; nervous excitable persons and cases of cardiac weakness with defective circulation easily depressed by cold are better adapted to a moister and more sedative climate. This sedative peculiarity is essentially characteristic of the village and its immediate neighbourhood, but on the higher ground on the north side, where the elevation is 500 feet above sea level, the air is colder and more closely approximates to the former description, thus affording a choice of directions for outdoor exercise, depending on the patient's general condition and temperament.

THE MINERAL WATERS.

The mineral water as supplied at the well-house is the mixed waters of six different springs situated in a portion of the old workings of a copper mine in the side of the hill on the north of the village. These springs probably flow out of the rocks of the Old Red Sandstone formation which underlies the trap-tuff containing the mineral deposits. Their waters are collected in basins cut in the side of the side of the passage, and then conveyed by small pipes to settling tanks, from which a large pipe takes the combined water to the shaft where it is pumped up to the cistern on the surface. The daily supply available has been estimated at about 1000 gallons. The water is artificially heated for drinking and for the mineral baths but it can be obtained in the well-house at its natural temperature when preferred. On a recent analysis it was found to contain the following solid constituents, estimated in grains per gallon:

Magnesium Bromide:	5.00
Magnesium Chloride:	9.22
Magnesium Carbonate:	1.58
Sodium Chloride:	445.32
Calcium Chloride:	306.70
Calcium Carbonate:	9.45
Calcium Sulphate:	27.54
Alumina:	Trace
Silica:	.36
	805.17.

It is a clear, odourless fluid, without deposit. The specific gravity is 1.010, and from its purity the water is well adapted for bottling and transmission to other parts of the country. Samples that have been kept for many years may be seen at the well-house and are still as clear and chemically active as the fresh supply. Taken internally, its action in the first instance is aperient, then diuretic and finally tonic. The aperient action is obtained from the magnesium and sodium salts, while the calcium salts also present in the water are markedly diuretic. The sulphate of calcium is however quite inert and may be left out of account, but the chloride, of which there is a relatively large amount is well known as a useful remedy in tubercular disease and cases of defective nutrition. The carbonate is antacid and aids the other alkalizers. The tonic effects are obtained after the use of the water has been continued for a week or more, and result from the increase in metabolism and excretion, the improved circulation in the blood vessels of the alimentary tract and portal system, the increase in the secretions of the digestive glands, the stimulation of the liver, and the regular washing out of the bowel removing waste products of digestion and so preventing the retention and absorption of toxic bodies

formed in these waste products. The abstraction of serum from the intestinal capillaries, and the increased excretion of water by the kidney, gives great relief to the abdominal venous circulation in portal congestion, haemorrhoids, and inflammatory conditions of the pelvic organs. In cases of chronic gout, the free diuresis established by the continued use of water eliminates the excess of urates and uric acid and so interferes with the deposition of the sodium biurate in the tissues which would give rise to a gouty paroxysm. Dyspepsia, in its irritative and atonic varieties, is much benefited by a course of the water, and in chlorosis it is a valuable aid to the routine treatment with iron preparations, for not only is there a tonic effect produced, but the aperient action also prevents the constipation so frequently a concomitant of this form of anaemia. The retention of faecal matter and its subsequent decomposition results in the production in excess of H_2S, which, combining with the iron administered or contained in food, forms an insoluble sulphide of iron, and haemoglobin - the essential carrier of oxygen to the tissues - becomes deficient in one of its constituents amounting normally to 0.4%. The most suitable time for drinking the mineral water is when the

stomach is empty and digestive processes are not interfered with, which is usually in the early morning. A short walk may with advantage be taken both before and afterwards. The amount of the water to be imbibed at a time varies from a half to two or three pints, and taken hot it is more active and can be more readily drunk in quantity than at its natural temperature. The internal admonistration of the waters is, in many instances, advantageously combined with a course of the mineral baths. The water used in the baths is of the same composition as that for drinking purposes, and is heated to a temperature of 100°F. for each bath. Since they were introduced these baths have been largely taken advantage of and their use has been attended with most satisfactory results. The saline water acts as a powerful stimulant of the cutaneous surface, and, as shown by Schott at Nauheim, immersion in it is followed by increased circulation of blood in the superficial vessels, relieving the heart and other internal organs. The pulse rate is reduced in frequency and increased in force. After the baths have been continued for some days further results are obtained. Congested organs are relieved by the improved circulation through all parts of the body and the heart is enabled

to contract more efficiently, as the blood pressure is more equally distributed. An increase in the amount of urine also ensues, and is maintained for some time. The class of cases which receive most benefit from the baths, supplemented by the internal administration of the water, comprise gout, subacute and chronic rheumatism, rheumatoid arthritis, cardiac dilatation, arterio-sclerosis, dry eczema and acne. The attendants are skilled in the art of massage, and their intelligent interest in the cases goes far to make the treatment by hydrotherapy a success.

THE CLIMATE IN ITS MEDICAL ASPECTS.

Insular climates in their medical aspects have been arranged in accordance with the outstanding features which characterize their influence on the body into three groups: 1st, stimulating or tonic climates, where extremes of temperature are marked, the air dry and often in motion with strong air currents; and, sedative climates, with equable temperament, large rainfall and considerable relative humidity, and 3rd, intermediate climates*. Of these it is in the latter group that the climate of Bridge of Allan must undoubtedly be placed, as it holds an intermediate position between the extremes of stimulating and sedative varieties, being devoid of the relaxing character of the second group and of the variations of temperature and trying nature of the first. Its most notable features are, a daily and seasonal equability of temperature, a comparative freedom from strong winds, and a relative atmospheric humidity slightly above the average, which confers a sedative character, without being sufficient in amount to make the climate relaxing, as the sedative group proper inclines in many instances to be. The quest-

* Yeo. Medical Treatment. p.127.

ion of most practical moment to be considered is, what forms of disease are most favourably influenced by this climate? It cannot, however, be too strongly impressed that climate is only an aid to treatment, although a most efficient one and should not be allowed to displace other remedial measures. In many cases, as Sir James Clark* says, "when change of climate is determined upon, the physician, as well as the patient, is disposed to look upon it as the sole remedy" a state of matters which can only result in disappointment, whereas if treatment be actively continued, although it may be attended with little success at home, when the patient is placed in a favourable atmosphere, the therapeutic agents used now under advantageous circumstances, are followed by beneficial results hitherto unattainable. The influence of the local climate in disease arises from its sedative effects allaying irritation of mucous surfaces such as line the respiratory passages, its tendency to promote diaphoresis, and its influence in modifying inflammatory action. The purity of the atmosphere it aids a return to health also, by affording an ample supply of oxygen to the blood and so increasing metabolism in the tissues. The tendency to allay irritation of mucous surfaces is advantageously used

*Influence of Climate P.244.

in such conditions as recurrent laryngeal catarrh, chronic bronchitis and asthma, although cases of the latter disease suit widely different climates and an individual trial is necessary before judgment can be pronounced whether a climate is suitable or not. Irritable types of dyspepsia with gastritis also find much alleviation, and to persons who are the subjects of gout, the shelter from cold east winds that so commonly bring on an attack and the free action of the skin which is promoted is found most advantageous. The invigorating and restoring powers of the pure air and mild atmosphere render the climate of service to cases of debility after acute illnesses, and in anaemia, especially of the chlorotic variety, the importance of a change from close apartments and an indoor life, to this healthy atmosphere cannot be overestimated. In phthisis, the local climate with its sunshine, pure atmosphere, equable temperature and freedom from cold winds is specially suited to the open air treatment of this disease, a method which aims at improving the functional activity of the body and increasing the resisting powers of the tissues. The cases which derive most benefit are those where the tubercular deposits are few in number, the disease comparatively quiescent, and where the general condition admits of a certain

amount of out-door exercise, as in walking. Patients required to be encouraged to persevere in this line of treatment, as at first they complain of breathlessness and feel fatigued after a short walk, but by continuing to spend a longer time each day in the open air they gradually overcome these difficulties and are soon able to take advantage of the numerous paths along the hill slopes, the ascent of which requires increased respiratory effort, the pulmonary air vesicles are more fully expanded and a larger supply of oxygen is carried to the tissues, while the general circulation is accelerated. The healthful influence of this exercise in a pure atmosphere, combined with plenty of good food and comfortable dwelling houses, is followed after a few weeks by an improvement in the general condition of the patient that is very marked, the appetite returns, sleep is more easily obtained, and a distinct gain in the body weight is experienced. Phthisical patients with a tendency to bronchial catarrh, and those of sensitive temperament, are enabled to leave their rooms and enjoy the country walks during spring at Bridge of Allan, owing to the sheltered situation and freedom from sudden extremes of temperature.

Such then, is an account of the important characteristics which have made Bridge of Allan a resort for the invalid and valetudarian, and a place of rest amidst historic surroundings and fine scenery for the mental fatigue of the overworked business man, and for all those whose everyday occupations require them to spend the greater part of their time within the offices and workrooms of the city.

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